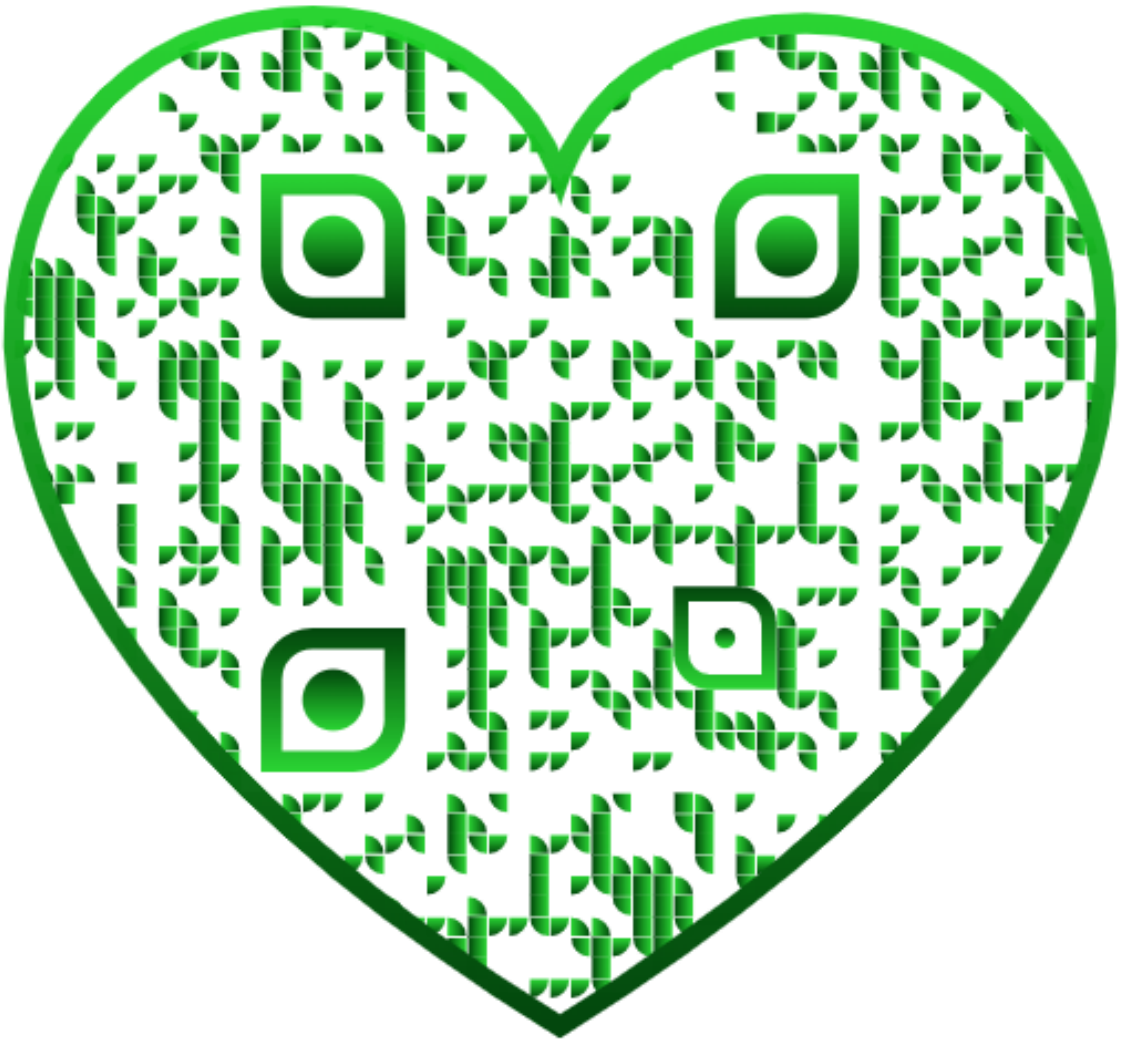
Chapter Six

Cost Effectiveness Analysis (CEA)



Objectives

- Upon completing this chapter, you will be able to:
  - Describe cost-effectiveness analysis (CEA)
  - Illustrate the use of a cost-effectiveness plane and Grid
  - Discuss the different methods of presenting CEA results
  - Discuss the appropriate application of CEA
  - Allocate resources between independent interventions
  - address the advantages and disadvantages of CEA

Introduction

- Suppose that our interest is the prolongation of life after renal failure and that we are comparing the costs and consequences of hospital dialysis with kidney transplantation.

- Consequently we would not automatically lean towards the least-cost intervention unless it also resulted in a greater prolongation of life.

- In comparing these alternatives we would normally calculate this prolongation and estimate incremental cost per unit of effect (that is, the extra cost per life-year gained of the more effective and more costly option).

Introduction…

- Such analyses, in which costs are related to a single, common effect that may differ in magnitude between the alternative interventions, are usually referred to as cost-effectiveness analyses (CEAs).

- The results of such comparisons may be stated either in terms of incremental cost per unit of effect, as in this example, or in terms of effects per unit of cost (life-years gained per dollar spent)

- if retrospective cost data are collected for more than 1 year or if the cost data are estimated for more than 1 year into the future, it is important to adjust or discount these costs to one point in time

Cost-effectiveness analysis (CEA)

- **CEA** measures costs in monetary value and outcomes in non monetary value/natural health units.
- This natural health units indicate an improvement in health such as cures, lives saved, or blood pressure reductions.
- Natural units like cases cured, lives saved, complications prevented, S/E reduced or reduced mortality
- This is the most common type of pharmacoeconomic analysis found in the pharmacy literature.
- Useful in balancing cost with patient outcome and identify which treatment alternative represent the best outcome per dollar/ETB.

CEA: Advantage and Disadvantage

- **Advantage**
  - relatively simple to carry out
  - Health units are familiar to **practitioners**.
  - Outcomes **do not need** to be converted to monetary values.
  - Useful when decision maker must choose between a range of program options.
  - Other outcomes are easier to quantify than CUA and CBA

CEA: Advantage/disadvantage

Disadvantage…

- Interventions with different types of outcomes can not be compared can't combine more than one important outcome.

- Difficult to collapse both the effectiveness and the side effects into one unit of measurement.

- CEA estimates extra cost associated with each additional unit of outcomes, but who is to say that added cost is worth added outcomes? Requires judgment call.

CEA: Advantage/disadvantage

Disadvantage:

- Alternatives used in the comparison must have outcomes that are measured in the **same clinical units**.

- CEA cannot use to directly compare the outcomes of cases with different **measures**.

- **Example**.
- Outcome of an antihypertensive product (use mm Hg to measure changes to determine the outcome) vs

- Outcomes of an asthma product (measure forced expiratory volume [FEV] to determine the outcome

When to use CEA?

CEA is used when outcomes are measured in natural units - clinical outcomes

• Examples of natural unit outcomes that can be used in CEA include:

– number of lives saved/ increased life expectancy

– number of cases cured/ decreased morbidity

– number of cases prevented/decreased morbidity

– number of deaths averted/ decreased mortality

– laboratory values (such as reductions in hemoglobin A1c, reduction in mm HG, reductions in low-density lipoprotein cholesterol levels etc.)

CEA data and Interventions

- CEA can provide valuable data
  – for resource allocation
  – to support drug policy
  – for formulary management and
  – for individual patient treatment decisions
- an intervention is considered cost effective if it is;
  – less costly and more effective
  – less costly and equally effective
  – more costly and more effective, with the added benefit (Δ E) worth the added cost (Δ C)
  – less costly and less effective, with the added benefit (Δ E) of the alternative not worth the added cost (Δ C)
  • challenge:
  – decision as to whether the added benefit worth the added cost

Incremental Cost-Effectiveness Ratios..

- When **two options are compared**, the ICER is calculated by the formula:

$$ICER = \frac{C_{Option2} - C_{Option1}}{Effectiveness_{Option2} - Effectiveness_{Option1}}$$

- ICER yields the additional cost required to obtain the additional effect gained by switching from drug A to Drug B.

$$\text{Incremental Cost Effectiveness Ratio} = \frac{\text{(cost of drug A - cost of drug B)}}{\text{(benefits of drug A -benefits of drug B)}}$$

$$\text{ICER} = \frac{\text{difference in costs (A-B)}}{\text{difference in benefits (A-B)}}$$

Cost-effectiveness Grid

- A cost-effectiveness grid can be used to illustrate the definition of cost-effectiveness. comparing a new drug with the current standard treatment

Cost effectiveness	Lower cost	Same cost	Higher cost
Lower effectiveness	A	B	C
Same effectiveness	D	E	F
Higher effectiveness	G	H	I

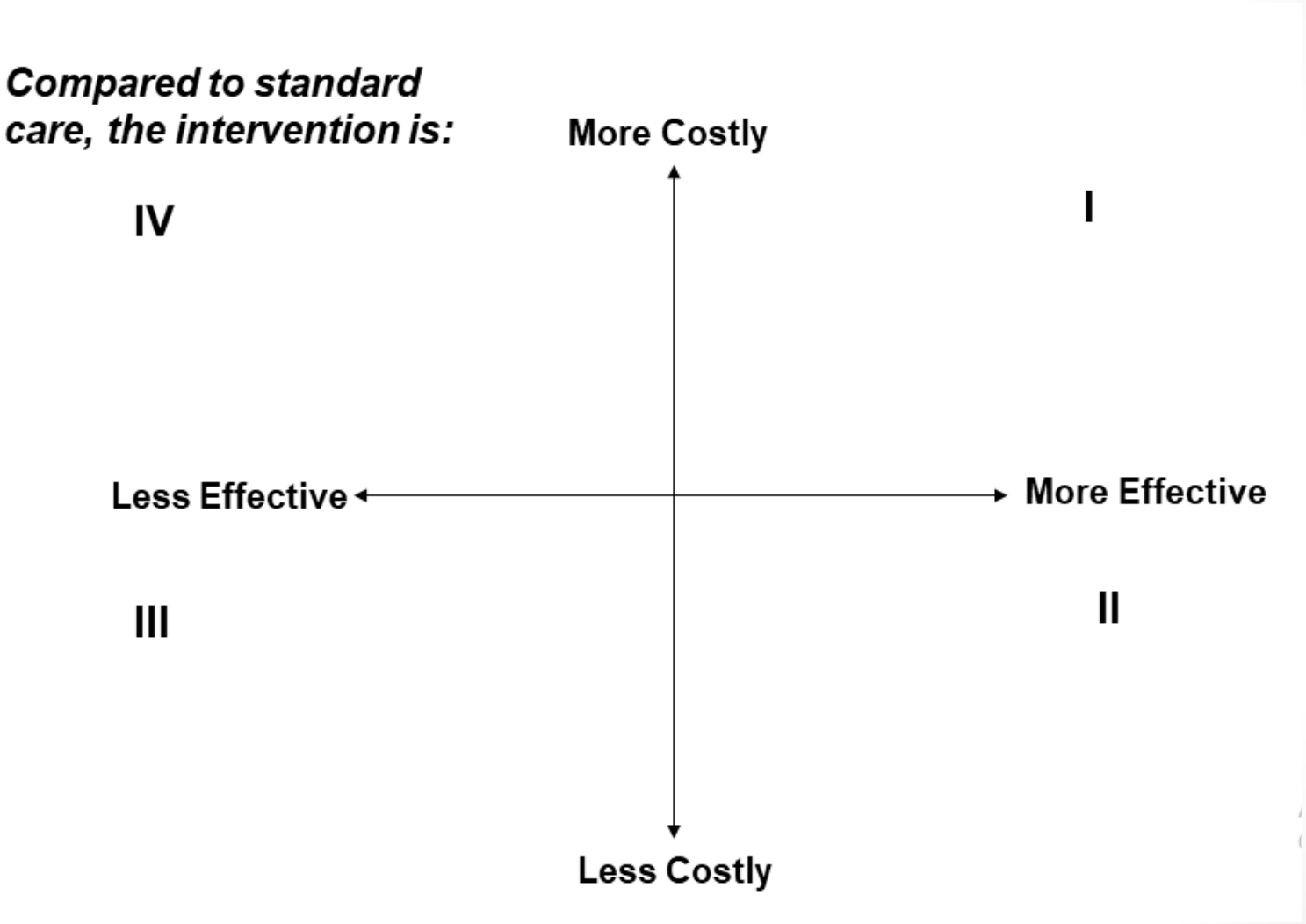
are cost effective choices

are not cost effective

Cost Effectiveness Plane

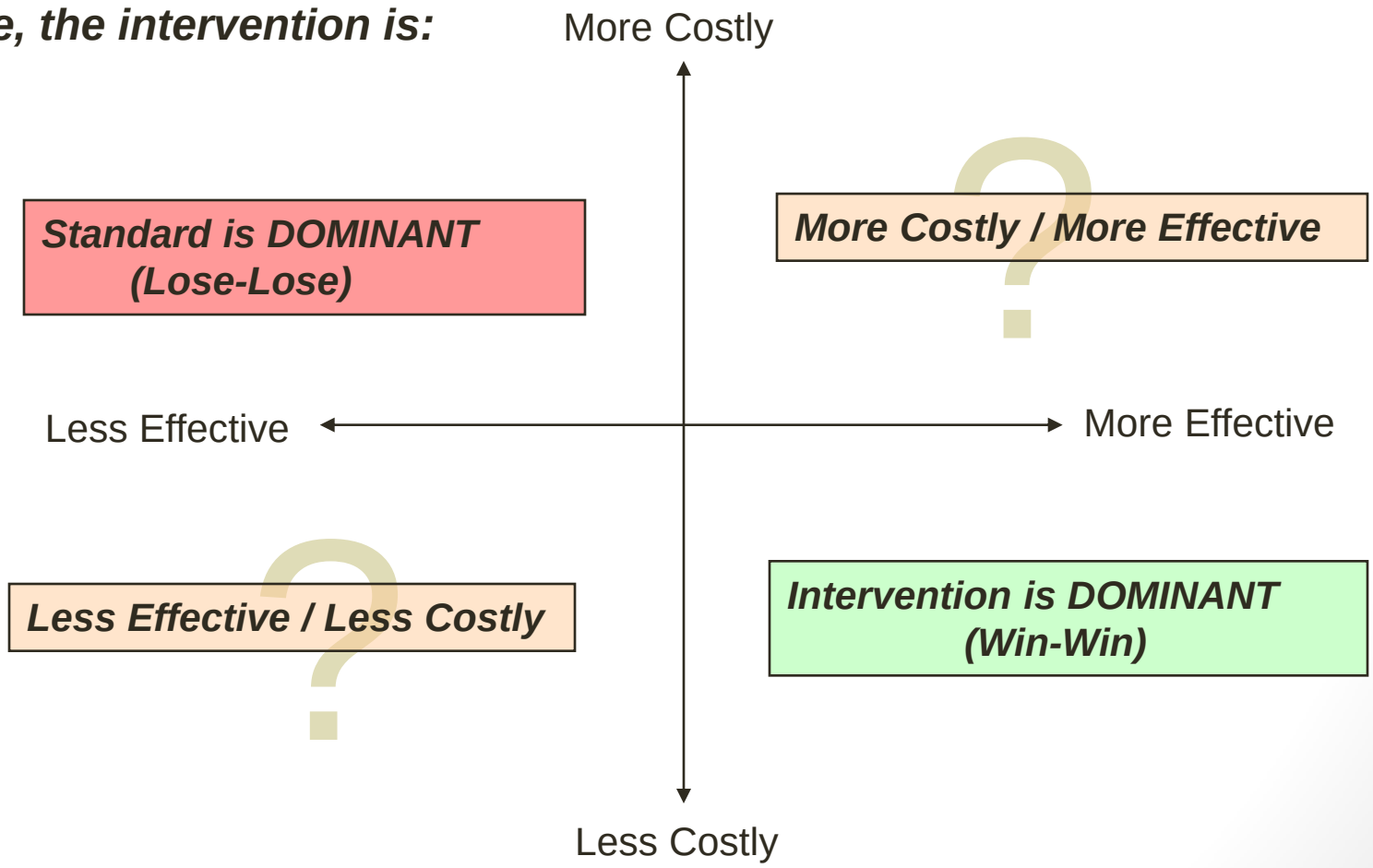
- Cost-effectiveness plane represent the differences in costs and health outcomes between treatment alternatives in two dimensions, by plotting the costs against effects on a graph.
- Health outcomes (effects) plotted on x axis, costs on the y.
- Cost-effectiveness plane is divided into four quadrants.
- Cost-effectiveness planes useful to show the uncertainty around cost-effectiveness outcomes, often represented as a cloud of points on the plane corresponding to different iterations of an economic model in a (probabilistic) sensitivity analysis.

Cost Effectiveness Plane



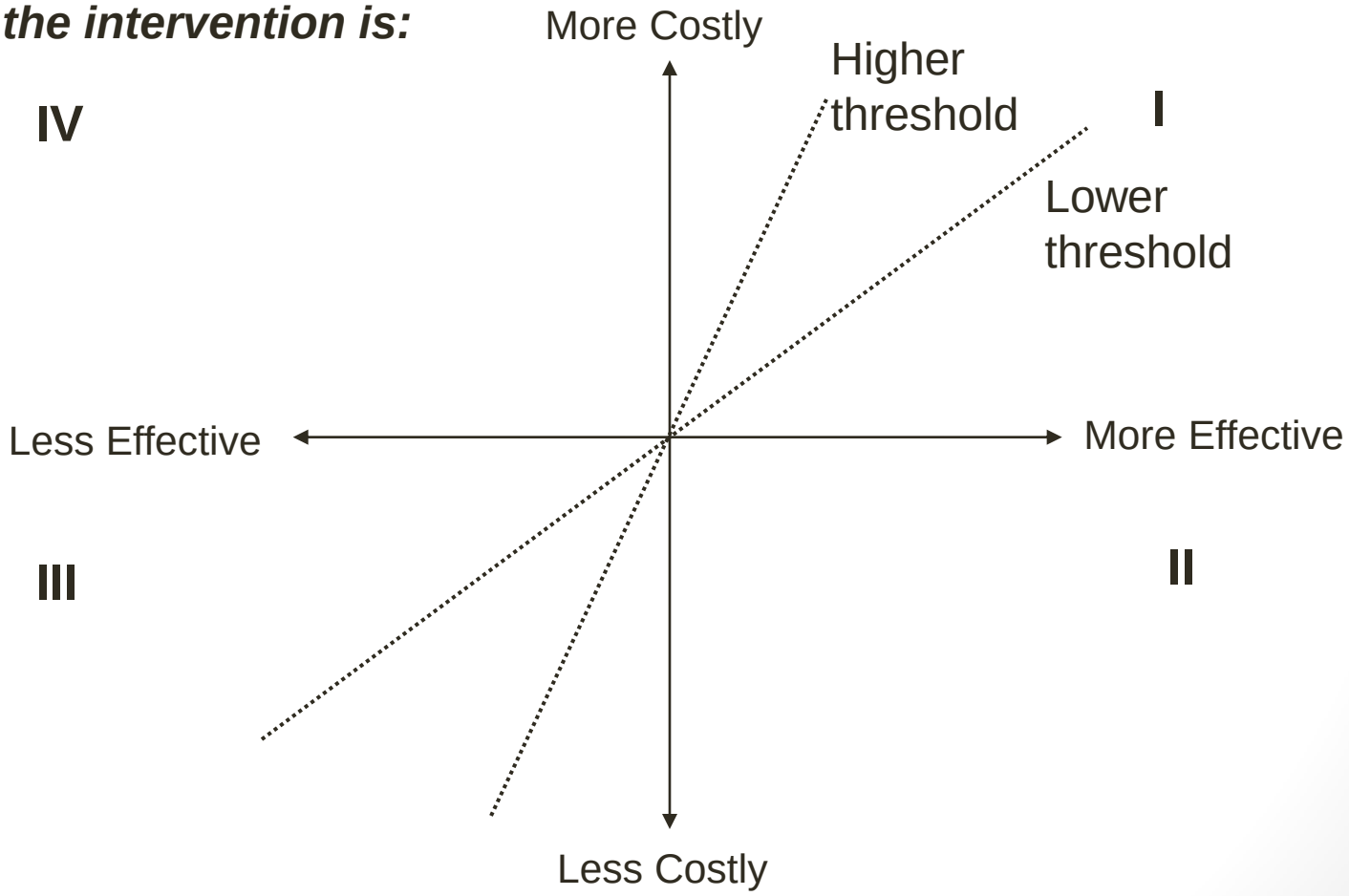
Possible Scenarios

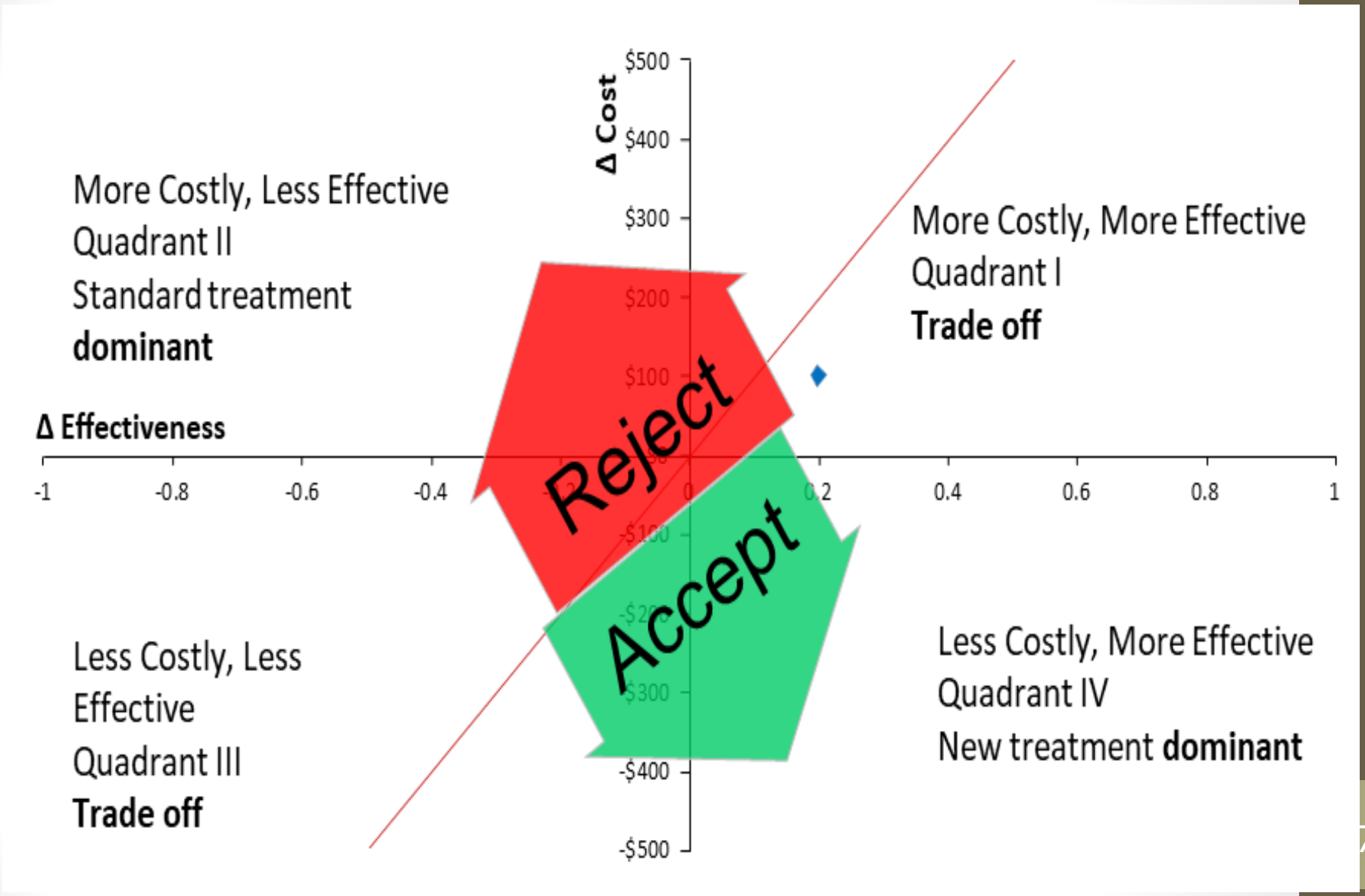
Compared to standard care, the intervention is:



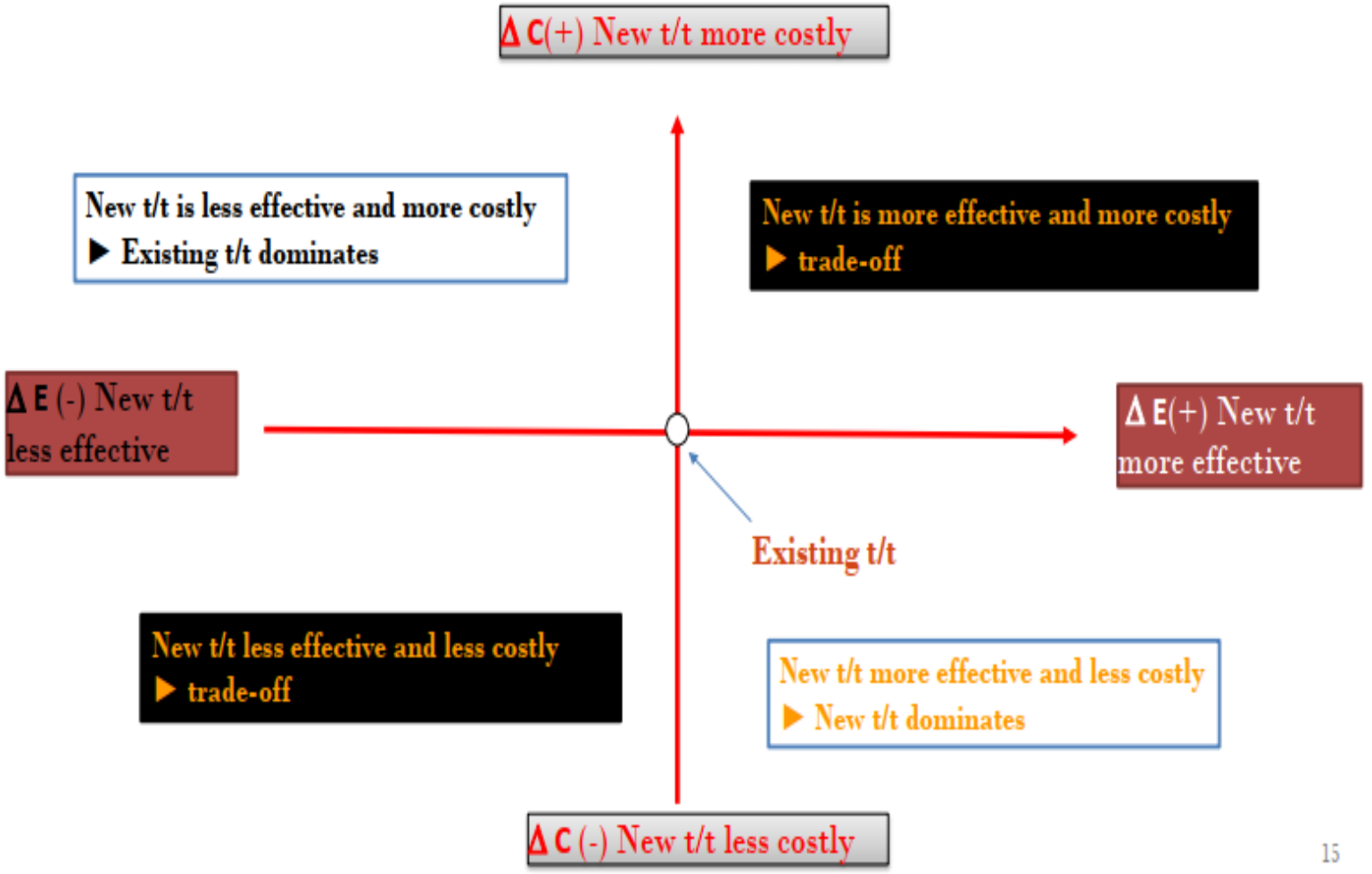
Threshold Cost-Effectiveness

Compared to standard care, the intervention is:




More Costly, Less Effective
Quadrant II
Standard treatment
dominant
More Costly, More Effective
Quadrant I
Trade off
Δ Cost
$500
$400
$300
$200
$100
Δ Effectiveness
-1
-0.8
-0.6
-0.4
0.2
0.4
0.6
0.8
1
Reject
Accept
-$400
-$500
Less Costly, Less
Effective
Quadrant III
Trade off
Less Costly, More Effective
Quadrant IV
New treatment dominant

MAKING DECISIONS WITH THE COST-EFFECTIVENESS PLANE


Δ C(+) New t/t more costly
New t/t is less effective and more costly
▶ Existing t/t dominates
New t/t is more effective and more costly
▶ trade-off
Δ E (-) New t/t less effective
Δ E(+) New t/t more effective
Existing t/t
New t/t less effective and less costly
▶ trade-off
New t/t more effective and less costly
▶ New t/t dominates
Δ C (-) New t/t less costly

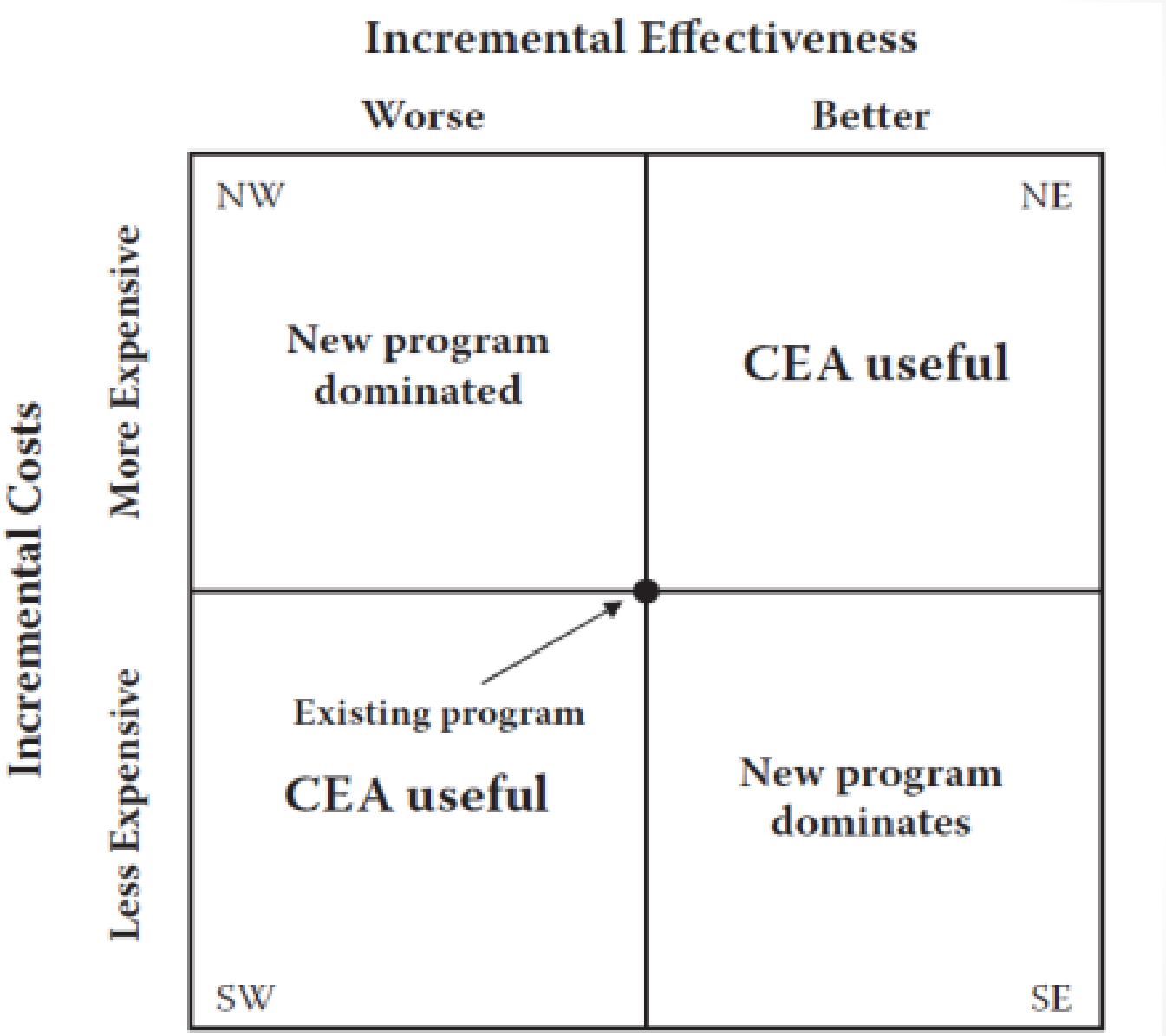
15

CE…..Plane

- The cost-effectiveness plane is typically drawn with
  - The differences in cost (or the incremental cost) on the y-axis, and
  - The differences in effectiveness (or incremental effectiveness) on the x-axis
- The example- below compares an existing program with a new program
- The existing program, acting as the comparator, will be at the origin of both the cost & effectiveness axes.

CE…..Plane

- The new therapy compared to the current option
  - Can be more expensive, less expensive, or equivalent in costs
  - Can be more effective, less effective, or equivalent in clinical effectiveness
- This produces four possible options for the results of the analysis of a new strategy compared with an existing one


Incremental Effectiveness
Worse
Better
Incremental Costs
More Expensive
Less Expensive
NW
NE
New program dominated
CEA useful
Existing program
CEA useful
New program dominates
SW
SE

Methods of presenting CEA results

Three methods of presenting cost effectiveness results:

- Average Cost Effectiveness ratio (ACER)
- Marginal Cost Effectiveness ratio (MCER)
- Incremental Cost Effectiveness ratio (ICER)

Average Cost Effectiveness Ratio/ACER

- is ratio of costs to outcomes for a single intervention

$$\text{ACER of intervention A} = \frac{\text{Cost of intervention A}}{\text{Outcome of intervention A}}$$

- used to choose the alternative with the least cost per outcome

- Average cost effectiveness ratio can be used to compare efficiencies of various interventions
  - higher average cost indicates that the resource utilization is less efficient
  - E.g. average cost per condom distributed for an STD clinic Vs. average cost per condom distributed for outreach program

- ACER reflects the cost per outcome of an intervention independent of other alternatives
- it is used to allocate resources between independent interventions when available budget is limited
  - Example: Hepatitis B vaccination Vs. HIV testing
- not used to compare mutually exclusive interventions

Example 2: The following table shows t/t costs and number of strokes that can be prevented using preventiv strategies A & B. Determine the average cost effectiveness ratios of the two strategies.

Preventive strategies	Total cost for 100 patients	Strokes prevented	Average cost effectiveness ratio/ACER
A	$10,000	10	$1000/stroke prevented
B	$60,000	50	$1200/stroke prevented

Marginal Cost Effectiveness Ratio/MCER

- marginal cost effectiveness ratio is ratio of additional costs to a single additional outco

$$MCER = \frac{\text{Cost of intervention A' - Cost of intervention A}}{\text{Outcome of intervention A'- Outcome of intervention A}}$$

- it examines effects of scale within a single program

– does cost per health outcome increase or decrease as program changes in size?

Example 3: The following table shows costs and number of cases that can be prevented using program A and expanded program A (A'). Determine the marginal cost effectiveness ratio.

Programs	Prevented cases	Total costs
Program A	30	$450
Expanded program A (A')	36	$600

Incremental Cost Effectiveness Ratio /ICER

- incremental cost effectiveness ratio is ratio of additional costs to additional outcomes obtained when one intervention is compared to the next most effective intervention

$$\text{ICER} = \frac{\text{Cost of intervention - Cost of alternative intervention}}{\text{Outcome of intervention - Outcome of alternative intervention}}$$

- ICER is the difference in total costs of two therapies divided by difference in effectiveness of the two interventions
- ICER shows the cost per unit outcome of switching from the less effective and less costly t/t option to the more effective and more costly t/t option
- it is used to determine the magnitude of the added cost for each unit health improvement

Example 3: The following table shows t/t costs and number of life years that can be saved using two drugs A & B.

a.determine the incremental cost effectiveness ratio (ICER).

b.how do you interpret the result?

Mutually Exclusive Interventions	Outcomes (Life Years saved)	Costs
Treatment A	9	$90,000
Treatment B	11	$110,000

Ans.

Mutually Exclusive Interventions	Outcomes (Life Years saved)	Costs	▲ Outcome	▲ Cost	ICER
Treatment A	9	$90,000	---	---	---
Treatment B	11	$110,000	2	$20,000	$10,000

a. ICER = $10,000 per additional Life Year saved

b. Interpretation: on average, it costs $1,000 to save one additional life year using drug B

WHO cost effectiveness Threshold

- If ICER < the country's GDP per capita --- very cost effective
- If ICER 1-3 times the country's GDP per capita --- cost effective
- If ICER > 3 times the country's GDP per capita --- not cost effective
- In other words,
  - If ICER ≤ 3x GDP per capita, choose the more costly and the more effective t/t option
  - If ICER > 3x GDP per capita, choose the less costly and the less effective t/t option

Efficacy versus effectiveness

- Many pharmacoeconomic studies use data from randomized clinical trials (RCT). These studies are sometimes referred to as ***cost-efficacy analyses.***
- RCTs are used to establish efficacy—"if a drug can work"—under relatively ideal conditions.
- Pharmacoeconomic studies are more interested in the assessment effectiveness—"if a drug does work"—in real-world practice.
- RCTs are used to establish efficacy—"if a drug can work" under relatively ideal conditions.
- Pharmacoeconomic studies are more interested in the assessment of effectiveness—"if a drug does work"—in real-world practice

Measuring Effectiveness…

Select Effectiveness Indicator

- Must be consistent with the treatment objective of the drug/program being evaluated
- Should incorporate both benefits and harms of alternative interventions
- Final health outcomes preferred to intermediate (surrogate) outcomes

Common Applications of CEA

- Common CEA application: medications with the same type of primary outcomes, and most often for treatment of the same types of health conditions.

- CEA is only performed when the outcome of one interventions is both better than another and the cost is greater.

Steps in Conducting CEA

1. Identify costs and effects of the program: Define objectives—which medicine regimen is preferred to achieve the desired clinical outcome (e.g., cure)?

2. Identify the baseline and Order options by expected cost: List the different options (medicines and other treatments) to achieve the desired clinical outcome.

3. Exclude dominated alternatives: Identify and measure for each option: (1) cost and (2) clinical outcome.

Steps….

4. Calculate ICER: the incremental cost-effectiveness ratio.

5. Re-exclude dominated alternatives

6. Re-calculate ICER: Perform sensitivity analyses. Adjust cost of variables and re- analyse to confirm or refute results.

7. Present the result for decision makers:

Steps in Conducting ICER

1. Construct an incremental decision index/ratio
   - Check for dominance of one alternative over another, i.e., one alternative produces the same or greater effect and costs less OR provides more effect for the same cost
   - Eliminate dominated alternatives
2. Rank order remaining alternatives from lowest to highest total cost
3. Calculate incremental ratio between least costly and next more costly alternative

Steps in Conducting ICER

ICER: Incremental $costs_{A-B}$/

incremental health $effects_{A-B}$

4. If there are more than 2 alternatives, proceed to next more costly alternative (C) and calculate an incremental ratio between B and C, and so on.

Examples of CEA outcomes

Clinical field	Effectiveness measure
Treatment of hypertension	mm Hg blood pressure reduction
Treatment of hypercholesterolaemia	Percentage serum cholesterol reduction
Diagnosis of DVT	Cases of DVT detected
Asthma	Episode-free days
Thrombolysis	Years of life gained

Example : Among the following mutually exclusive programs, choose the most cost effective program for implementation in Ethiopia? (GDP per capita of Ethiopia is $863)

Mutually Exclusive programs	Outcomes (Averted Cases)	Costs
Program A	100	$ 50,000
Program B	150	$ 130,000
Program C	110	$ 170,000

Step 1: Order by Increasing Effectiveness

Mutually Exclusive programs	**Outcomes** (Averted Cases)	**Costs**
Program A	100	$ 50,000
Program C	110	$ 170,000
Program B	150	$ 130,000

Step 2: Check for Dominance

Mutually Exclusive programs	Outcomes (Averted Cases)	Costs
Program A	100	$ 50,000
Program C	110	$ 170,000
Program B	150	$ 130,000

Step 3: Eliminate Dominated Programs

Mutually Exclusive programs	Outcomes (Averted Cases)	Costs
Program A	100	$ 50,000
Program B	150	$ 130,000

Step 4: Re-Calculate ICER without dominated programs

Mutually Exclusive programs	Outcomes (Averted Cases)	Costs	ΔOutcome		ICER
				ΔCost	
Program A	100	$ 50,000	–	–	–
Program B	150	$ 130,000	50	$80,000	$1,600

Since the ICER is less than 3x the GDP per capita of Ethiopia ($ 1,600 vs $2,589), program B is the most cost effective for implementation in Ethiopia.

- Example: Among the following t/t options, which one is the most cost effective for a country which has a GDP per capita of $900? What about for a country which has a GDP per capita of $200?

Mutually Exclusive Interventions	Outcomes (Life years saved)	Costs
treatment A	30	$ 20,000
treatment B	10	$ 5,000
treatment C	15	$ 13,000
treatment D	11	$17,000

Step 1; Arrange in increasing order of effectiveness

Mutually Exclusive Interventions	Outcomes (Life years saved)	Costs
treatment B	10	$ 5,000
treatment D	11	$17,000
treatment C	15	$ 13,000
treatment A	30	$ 20,000

Step 2; Check for dominance

Mutually Exclusive Interventions	Outcomes (Life years)	Costs
Treatment B	10	$ 5,000
Treatment D	11	$17,000
Treatment C	15	$ 13,000
Treatment A	30	$ 20,000

Step 3; Remove dominated treatment option

Mutually Exclusive Interventions	Outcomes (Life years saved)	Costs
Treatment B	10	$ 5,000
Treatment C	15	$ 13,000
Treatment A	30	$ 20,000

Step 4; Re-calculate ICER without dominated t/t option

Mutually Exclusive Interventions	Outcomes (Life years saved)	Costs	Outcome ▲	Cost ▲	ICER
Treatment B	10	$ 5,000		---	---
Treatment C	15	$ 13,000	5	$8,000	$1,600
Treatment A	30	$ 20,000	15	$ 7,000	$ 467

Step 5 ; Remove t/t option C since it is weakly dominated by t/t A

Mutually Exclusive Interventions	Outcomes (Life years)	Costs	▲Outcome	▲Cost	ICER
Treatment B	10	$ 5,000			
Program C	15	$ 13,000	5	$ 8,000	1,600
Treatment A	30	$ 20,000	15	$ 7,000	467

Step 6; Recalculate the ICER without the weakly dominated t/t option

Mutually Exclusive Interventions	Outcomes (Life years)	Costs	▲ Outcome	▲ Cost	ICER
Program B	10	$ 5,000	---	---	---
Program A	30	$ 20,000	20	$ 15,000	**$ 750**

Since the ICER is less the GDP per capita ($ 750 vs $ 900), program A (the more effective and more costly option) is the most cost effective.

- **To overcome some of the disadvantages with using the ICER, an increasingly popular method of presenting results in CEA studies is converting the results to a Incremental Net Benefit (INB)**
- The INB calculation requires defining the willingness to pay threshold for effectiveness, and studies should use the country-specific value
- The willingness to pay threshold reflects how much policy makers will spend to gain one extra unit of health outcome (i.e. effectiveness)

- The INB is calculated using the following formula:

[Maximum WTP × Incremental Effectiveness]— Incremental Cost

- the maximum acceptable **willingness to pay,** is represented by lambda (λ)

$$INB = (\lambda \times \Delta \text{ Effectiveness}) - \Delta \text{ Costs}$$

– λ represents society's willingness to pay for a unit of health

- if INB > 0, the more effective and more costly option is cost-effective
- if INB < 0, the less effective and less costly option it cost-effective

- Example : Costs and outcomes for BreatheAgain were compared with inhaled corticosteroids. BreatheAgain had total costs of $537 and provided 90 symptom free days (SFDs) compared with $320 and 45 SFDs for ICS. The incremental cost effectiveness ratio (ICER) was $4.82 per extra SFD. It has been suggested that a day without asthma symptoms is worth at least $5 (Rutten-van Molken *et al*.). Which one is cost effective at λ = $5.00?

Ans.

INB = (λ x Δ SFDs) - Δ Costs

INB = ($5 x 45 SFDs) - $217

INB = $ 8

Because the INB is greater than zero, BreatheAgain is more cost-effective than inhaled corticosteroids when λ = $5.00.

Resource Allocation between Independent Interventions-ACER

- Steps

1. calculate average cost effectiveness ration/ACER
2. rank the programmes in increasing order of ACER
3. calculate cumulative outcomes and cumulative costs
4. decide the maximum benefit you can gain from your budget (make resource allocation decisions)

Exercise 1. (demonstrating CEA steps)

Assume four exclusive interventions given below with total outcomes (life years) and total costs given below

Mutually exclusive interventions	Total outcome (life years)	Total costs
Program A	30	$200,000
Program B	10	$50,000
Program C	15	$130,000
Program D	11	$170,000

Exercise …

Step 1: Arrange in increasing order of effectiveness

Mutually exclusive interventions	Total outcome (life years)	Total costs
Program B	10	$50,000
Program D	11	$170,000
Program C	15	$130,000
Program A	30	$200,000

Exercise …

Step 2: Calculate change in outcome and cost

Mutually exclusive interventions	Total outcome (life years)	Change in outcome	Total costs	Change in cost
Program B	10		$50,000	
Program D	11	1	$170,000	$120,000
Program C	15	4	$130,000	(-$40,000)
Program A	30	15	$200,000	$70,000

Exercise …

Step 4: Removing dominated program

Mutually exclusive interventions	Total outcome (life years)	Change in outcome	Total costs	Change in cost	ICER (c/e)
Program B	10		$50,000		
Program D	11	1	$170,000	$120,000	120,000
Program C	15	4	$130,000	(-$40,000)	(10,000)
Program A	30	15	$200,000	$70,000	4,667

Exercise …

Step 5: Removing program C as there is weak dominance

Mutually exclusive interventions	Total outcome (life years)	Change in outcome	Total costs	Change in cost	ICER (c/e)
Program B	10		$50,000		
Program C	15	5	$130,000	$80,000	16,000
Program A	30	15	$200,000	$70,000	14,000

Exercise …

Step 6: Recalculate the ICER

Mutually exclusive interventions	Total outcome (life years)	Change in outcome	Total costs	Change in cost	ICER (c/e)
Program B	10		$50,000		
Program A	30	20	$200,000	$150,000	7,500

Exercise 2

❺ CEA Exercise: Treating stomach ulcer symptoms.

Given the costs and outcomes below, calculate:

1. The *Average* Cost-Effectiveness Ratios for each drug.
2. The *Incremental* Cost-Effectiveness Ratio for Drug B vs. Drug A.

	Drug A	Drug B
Cost	$210 per year	$530 per year
Outcome: GI SFD	200 SFD	250 SFD
Average Cost-Effectiveness Ratio (CER)	?	?
Incremental Cost-Effectiveness Ratio (ICER)	?	

How do you interpret the CER and ICER?

Can you tell which drug is most cost-effective?

GI SFD = Gastrointestinal Symptom-Free Day

Answer

Answers to CEA Exercise: Treating stomach ulcer symptoms.

	Drug A	Drug B
Cost	$210 per year	$530 per year
Outcome: GI SFD	200	250
Average Cost-Effectiveness Ratio (CER)	$210/200 SFD = $1.05 per SFD	$530/250 SFD = $2.12 per SFD
Incremental Cost-Effectiveness Ratio (ICER)	($530-$210) / (250 SFD – 200 SFD) = $6.40 per extra GI SFD	

The Average CER of Drug B is approximately double that of Drug A ($2.12 vs. $1.05 per GI symptom-free day). The Incremental CER tells us that if we treat an average patient with Drug B instead of Drug A, that patient will have an additional 50 SFDs at a cost of $6.40 for each of those 50 days. It's hard to say with this information alone if $6.40 per extra GI symptom-free day is reasonable.

GI SFD – Gastrointestinal Symptom Free Day

Exercise 3

- If we only have $2500 to spend on health interventions, which one of these health interventions you fund first?
  - First, let's put them in order of average cost effectiveness:

Intervention	QALY Gained (~DALY eliminated)	Net cost	Average CE ($/QALY)
A	50	$1000	$20/QALY
C	40	$1200	$30/QALY
B	3	$300	$100/QALY

Ex…3

- The average cost effectiveness
- Average C/E = Net Cost/ Net Health Benefit

  = $/QALY (gained) or $/DALY (eliminated)
- The average cost effectiveness of intervention A,
  - Average C/E (A)= $1000/50 QALYs = $20/QALY
  - Average C/E (B) = $100/QALY
  - Average C/E (C) = $30/QALY

Exercise ...3

- It looks like A should be covered first because it has the best (lowest) cost-effectiveness ratio compared to the other interventions.
  - i.e. $20/QALY vs. $30/QALY or $100/QALY
- This would be a more efficient way of spending your money
- However, in many instances, **noncompeting choice** is not the right way to compare interventions
- Instead, we may be faced with a situation where we have several alternatives but we can only choose one

CEA…..

- This means our interventions are mutually exclusive (i.e. you can choose A or B but not both)
  - A situation like this calls for a different method of determining cost-effectiveness called **competing choice**
- **Competing choice cost-effectiveness**
  - Requires the use of incremental cost-effectiveness ratio (NOT average cost effectiveness)
- The ICER allows you to determine the marginal or incremental cost for an additional unit of health benefit
  - When you are choosing b/n different interventions

Exercise ...4

Calculate the CEA of the given example

Intervention	QALY Gained (~DALY eliminated)	Net cost
X	20	$500
Y	30	$2000
Z	25	$1000

- In order to make the appropriate comparisons between interventions, we first need to order the interventions from least expensive to most expensive.

Exercise 4….cont'd

Intervention	QALY Gained (~DALY eliminated)	Net cost
X	20	$500
Z	25	$1000
Y	30	$2000

- How do we calculate the ICER?
  - For the purpose of this example we will assume that intervention X is the status quo (currently exists)
  - It is what we are already doing in practice and so is our base case comparator

Example …

- Let's calculate our first ICER by comparing intervention Z with intervention X
  - The incremental cost is found by calculating the additional cost of the more expensive program relative to the program that is just slightly less expensive than it
    - Incremental cost = Cost Z – Cost X

= $1000-$500

= $500

CEA….. Example

- Similarly, the additional health benefit is simply the additional health benefit of implementing a program relative to the program just less expensive than it
  - Incremental benefit= QALYs Z – QALYs X

= 25 QALYs -20 QALYs

= 5 QALYs

- Finally, divide the incremental cost by the incremental benefit
  - ICER = (Cost Z – Cost X)/ (QALYs Z – QALYs X)

= ($1000-$500)/(25 QALYs -20 QALYs)

= $500/5 QALYs

= $100/QALY

CEA…..

- This means that, if we choose to implement intervention Z in place of intervention X,
  - It would cost $100 per unit additional health benefit that we would get from implementing intervention Z
- Next we would compare intervention Y with intervention Z (NOT intervention X)
  - This is b/c we always want to compare the new intervention with the program that is just slightly less expensive than it
- So, what is our ICER when we compare intervention Y with intervention Z?

CEA…..

- So, what is our ICER when we compare intervention Y with intervention Z?
  - ICER = ($2000-$1000)/(30 QALYs – 25 QALYs)
    = $1000/5QALY
    = $200/QALY

Intervention	QALY Gained (~DALY eliminated)	Net cost	ICER ($/QALY)
X	20	$500	
Z	25	$1000	$ 100/QALY
Y	30	$2000	$ 200/QALY

CEA…..

- So, if we were NOT willing to spend $100/QALY, We would choose to stick with intervention X over the other interventions
- If we were only willing to spend $100/QALY, we would choose intervention Z over intervention X
- If we were to spend $200/QALY or more, we would choose intervention Y

End of Chapter Six